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## Editorial Comment

## ALL OUT

*All out—Yes All out*

*All out for Freedom*

*All out for Independence*

*All out for Democracy*

These are the reasons why we of these United States are part of the United Nations. Part, and a very large part of this greatest of all effort in Wars, to allow men to think and to speak freely. Freedom of thought, independence of action; men have fought for these beyond the earliest records of history.

It was the necessity for such freedom and independence that stimulated the foundation and the development of the American College of Chest Physicians, an organization that gave to men interested in tuberculosis, in diseases of the chest, an opportunity to prove the correctness of their imagination to discuss their problems in open forum, and to be allowed to achieve their goal of visualization. Nowhere is this better evidenced than in the annual meetings of our College at which time culmination of the year's efforts are summarized by, and to the gathering of the Fellowship of the College. Leadership in

scientific achievements, high standards of endeavor, are evidenced not only in those who come to report but in all of the members who have been accepted into the fold of our Fellowship. The Eighth Annual Meeting which is just a few months before us will set a new record in scientific reports and attendance and will maintain the high standards shown at the last several previous meetings.

A joint session with the American Bronchoesophagological Association; four scientific sessions in the College assembly; special groupings for discussion of military needs in medicine, for educational needs in medical schools and after; and several innovations will be found on the extensive program prepared. Outstanding and authoritative talent will be found in the names listed throughout the program.

All out for this meeting at Atlantic City, June 6-8 inclusive at the Hotel Dennis. All out to lend your voices in giving of your important experiences to share and improve necessary information to all interested in our problems. All out to make this the greatest of all our meetings.

B. G.

## Accessory Methods in the Diagnosis of Primary Carcinoma of the Lung

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Carcinoma of the lung is by no means as uncommon a disease as it was a score of years ago. Ewing<sup>1</sup> states that "It would appear that cancer of the lung causes between five and ten per cent of all cancer deaths; that, in spite of the absence of statistical proof, the impression of most clinicians should be accepted that the disease has increased markedly in the past two decades, from 1920 to 1940 . . ." This increase in incidence implies that the physician today will see more of these cases. It, therefore, behooves him to recognize these cases earlier. In a previous communication<sup>2</sup>, the statement was made that "If cancer of the lung is to be recognized at a time when it will still be amenable to some therapeutic measure, it must be diagnosed early. Meakins has defined a case of early cancer of the lung as one in which 'the original tumor is still localized and has not as yet involved either the peribronchial and mediastinal glands or any other adjacent structures, and before extensive pulmonary, pleural or distant metastases have occurred.' A neoplasm of the bronchial tree, beginning as an invasion of a relatively small part of the bronchial structure, must first produce irritation, erosion, hemorrhage, pressure, infection or obstruction before gross symptoms referable to the thorax will be elicited. The primary growth in such instances will rarely cause pain in the early stages. The early diagnosis depends on a careful consideration of what often appear to be trivial symptoms." The internist who has recognized the protean characteristics of this disease and the fact that it may produce minimal symptoms does not wait for the so-called pathognomonic signs and symptoms before making a tentative diagnosis of carcinoma of the lung. In addition to the complete history and carefully conducted physical examination the patient should have a thorough roentgenographic investigation of the chest. If such studies reveal any sus-

picious bronchopulmonary disease which is not readily explainable on the basis of a non-neoplastic process, bronchoscopy should be advised at once. At the time of the bronchoscopic examination some of the abnormal tissue can be removed for biopsy purposes. Assuming then that such investigation has been undertaken and no conclusive diagnosis has been established, the question that arises is how to proceed to prove or exclude the presence of a carcinoma.\*

It is the object of this communication to call attention to the accessory methods which can be employed in the diagnosis of carcinoma of the lung. These methods are:

- a) Cytologic studies of sputum
- b) Cytologic studies of the pleural fluid
- c) Lung puncture for biopsy studies
- d) Exploratory thoracoscopy and removal of tissue for biopsy
- e) Exploratory thoracotomy and removal of tissue for biopsy

### *Sputum Studies*

Dudgeon and Wrigley<sup>4</sup> have shown that carcinoma cells may be present in the sputum of a patient having a cancer of the lung. In 68 per cent of the proved cases of malignancy of the lung and larynx these authors were able to establish the diagnosis from the examination of the sputum. More recently Barrett<sup>5</sup> has again called attention to the value of such studies. He points out that quite frequently sputum will show malignant cells whereas other recognized methods will fail to do so. Care must be taken, however, in the examination of such specimens not to confuse scavenger cells, polymorphonuclear leucocytes and lymphocytes with malignant cells. In the cases with malignant disease one generally notes clumps of cells with hyperchromatic nuclei of irregular size, shape and position (frequently con-

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\* Although some investigators<sup>3</sup> state that about two-thirds of the cases of carcinoma of the lung can be diagnosed via the bronchoscope (with biopsy), there still remain about 30 per cent of cases which are undiagnosed by this method.

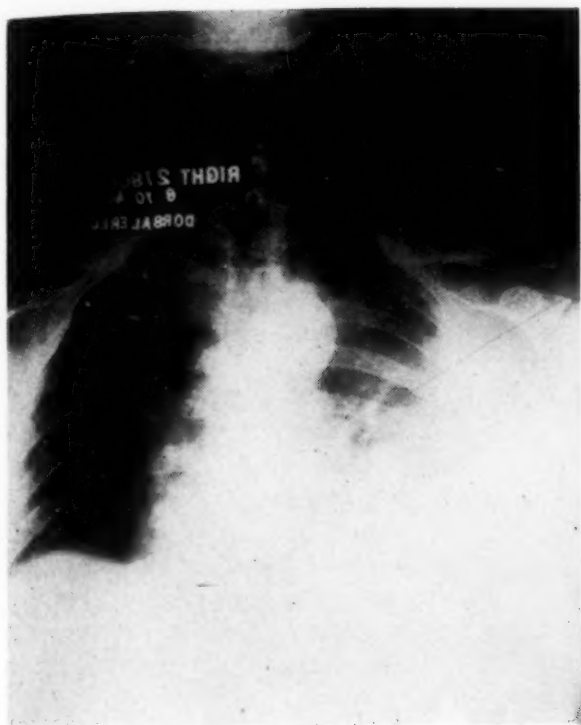


Fig. 1A

taining coarse granular chromatin), pale lavender staining cytoplasm and an indistinct cell membrane.

*Case I*—A. C., a white male, aged 52 years, entered the Jewish Hospital with a history of pain in the chest of three weeks duration. The pain was not constant and would occasionally radiate to the left side of the neck. About the same time as the onset of the pain, the patient also noticed a slight although persistent cough which was productive of a thin mucoid substance. Examination revealed a well developed male, not acutely ill. The right side of the chest and heart were essentially negative. On the left side of the chest there was flatness to percussion posteriorly over the lower half of the chest. In this area the breath sounds were distant.

*Impression*—Pleural effusion, etiology to be determined.

A roentgenographic examination of the chest (Fig. 1A) shortly after admission show-

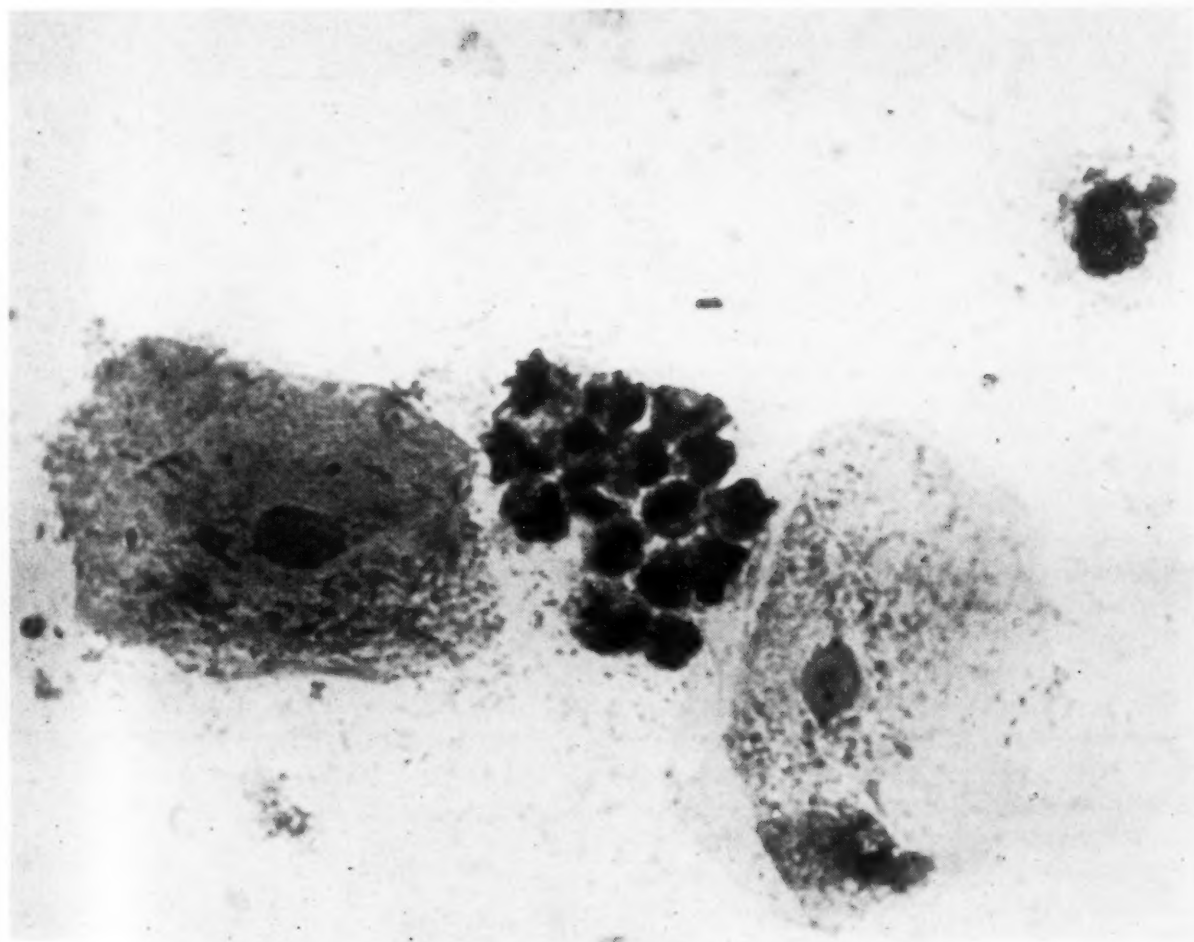


Fig. 1B



ed an opacity involving the lower half of the left hemithorax with some displacement of the mediastinum and heart to the right.

Several days later a bronchoscopic examination was undertaken. The bronchoscopist reported "the trachea was found to be normal. The carina was in the midline. The left and right bronchial orifices were markedly congested and edematous. There was no evidence of a new growth on the walls of the upper or lower bronchi."

Sputum obtained the same day as the bronchoscopy was performed was examined for malignant cells. The pathologist reported on the sputum (Fig. 1B) as follows: "In a lavender staining matrix there are numerous small and large mononuclear cells, red blood cells and many epithelial cells. There are also present groups of cells with hyperchromatic nuclei and abundant cytoplasm. In some of these the nuclei are peripherally placed. In other areas groups of epithelial cells are seen with many polymorphonuclear leucocytes interspersed among them. The picture is highly suggestive of malignancy."

#### *Pleural Fluid Studies*

Pleural effusion (serous, sero-hemorrhagic or hemorrhagic) is encountered in approximately 40 per cent of the cases of primary carcinoma of the lung sometime during the course of the illness. While such a condition suggests pleural involvement, it does not mean that the parietal pleura is necessarily involved in the malignant process, nor does it imply extensive disease on the surface of the lung. Zemansky<sup>6</sup>, following the technic of Mandelbaum<sup>7</sup>, was able to show cells characteristic of malignant disease in 50 per cent of his cases. Goldman<sup>8</sup>, using another technic, was able to make a positive diagnosis of carcinoma in 80 per cent of 20 pleural effusions.

Carcinoma cells in pleural fluid have the same characteristics associated with malignant cells found in the sputum, chief of which is clumping of atypical cells with deeply staining nuclei. The clumps, however, do not contain as many cells as are seen in the sputum. These cells may also have large eccentrically placed nuclei or several nuclei which in turn may show mitotic figures. These cells often tend to be swollen.

*Case II*—Patient, M. S., a white male, aged

55 years, was admitted to the Jewish Hospital of Brooklyn with a history of pain in the chest of about three months duration. About a year previously the patient had herpes zoster of the left chest from which he recovered completely after several weeks. He was perfectly well until three months before the present admission to the hospital when he began to have pains in the chest which became progressively more severe. Recently the patient has become dyspneic on slight exertion.

Examination revealed a well developed, well nourished man, not acutely ill, slightly cyanotic about the lips. The veins in the neck were prominent and the tissues edematous. There were also noted some glands in the right cervical region. The right side of the chest was fuller than the left and did not move as well, during respiration, as the contralateral side. There were noted also many prominent veins on the right side of the chest. The entire right chest was flat to percussion. The breath sounds on that side were very distant and had an amphoric character. The heart and left lung were essentially negative.

*Impression*—Right basilar pathology.

Interpretation of the roentgenogram of the

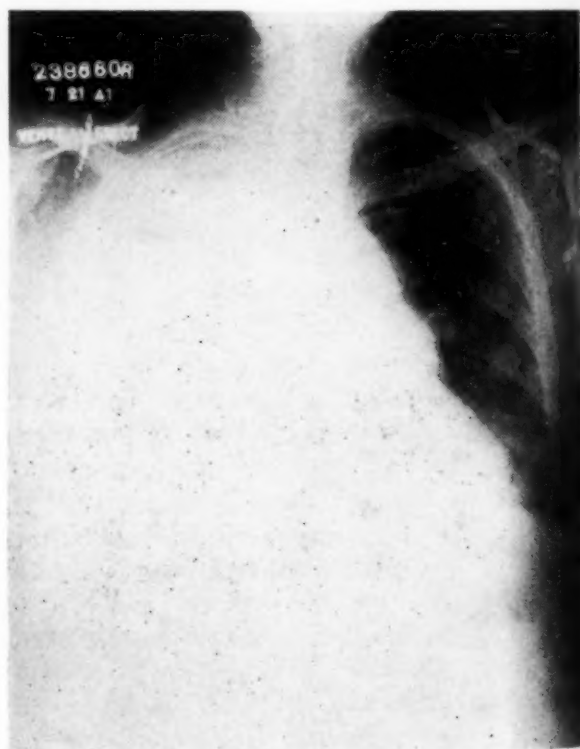


Fig. 2A



chest (Fig. 2A), taken soon after entering the hospital was as follows: "Dorsal view of the chest shows a haze involving the right hemithorax in which two distinct fluid levels can be seen. The exact nature of the findings cannot be definitely ascertained from this roentgenographic study. One may interpret this x-ray as indicative of pathology."

About one week later bronchoscopic examination was undertaken. The bronchoscopist recorded the following observations: "The carina identified and the right main bronchus entered. The orifice of the upper lobe bronchus was seen. No abnormalities were noted. At about the middle of the main bronchus there was a bulge in the lateral wall, causing stenosis beyond which the tube could not be passed. The middle and lower lobe bronchial orifices therefore could not be seen. On the wall of this bulge and on the floor of the main bronchus in this region there was some granulation tissue. Tissue for biopsy was not obtainable."

*Impression of the Bronchoscopist*—Stenosis of the right main bronchus possibly malignant.

At about the same time the bronchoscopy was performed, a right thoracentesis was done removing 1250 cc. of serohemorrhagic fluid and replacing it with air. The report of the pathologist on this fluid (Fig. 2B) was as follows: "Preparation consists of a pink and lavender staining matrix in which are scattered numerous red blood cells, small round cells, large mononuclear cells and some polymorphonuclear leucocytes. There are also present groups of large cells with deeply staining pink cytoplasm and vesicular nuclei. These in places are in small aggregates. In some cells the nuclei are somewhat peripherally placed and have a crescentic shape. The picture is that of malignancy."

#### *Lung Puncture*

Lung puncture for diagnosis was apparently first employed by Leyden<sup>9</sup> in 1883. This, however, was in a case of pneumonitis. Three years later Menetrier<sup>10</sup> employed this same method in a case of carcinoma of the lung. Recently Craver and Binkley<sup>11</sup> performed needle puncture of the lung for biopsy in 92 different pulmonary lesions of which num-

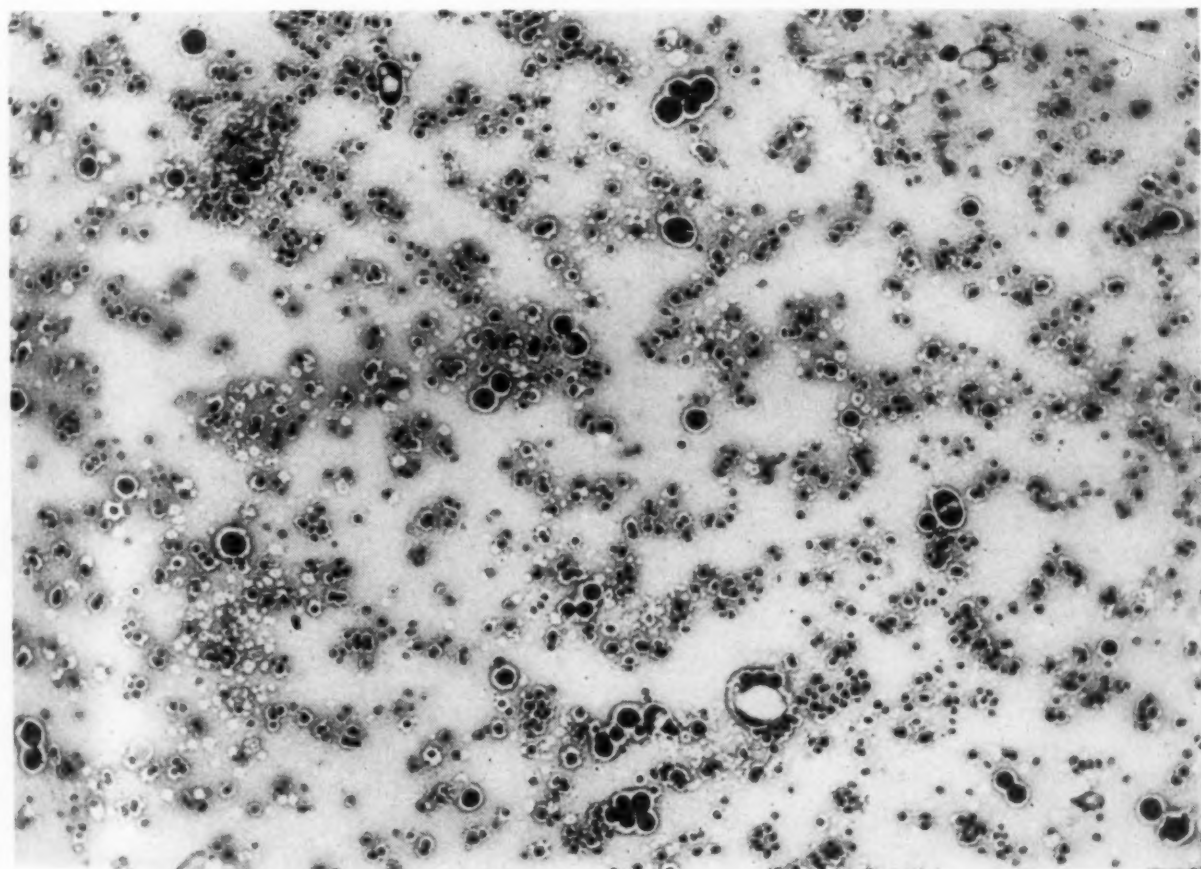
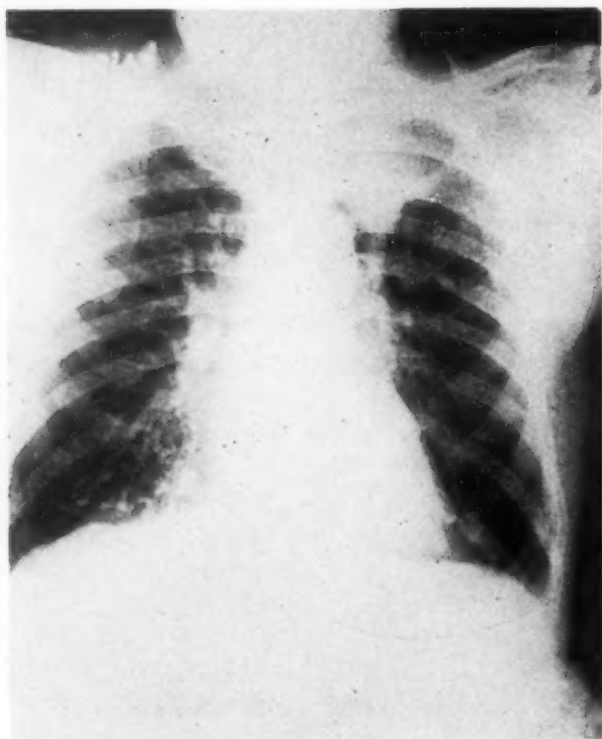


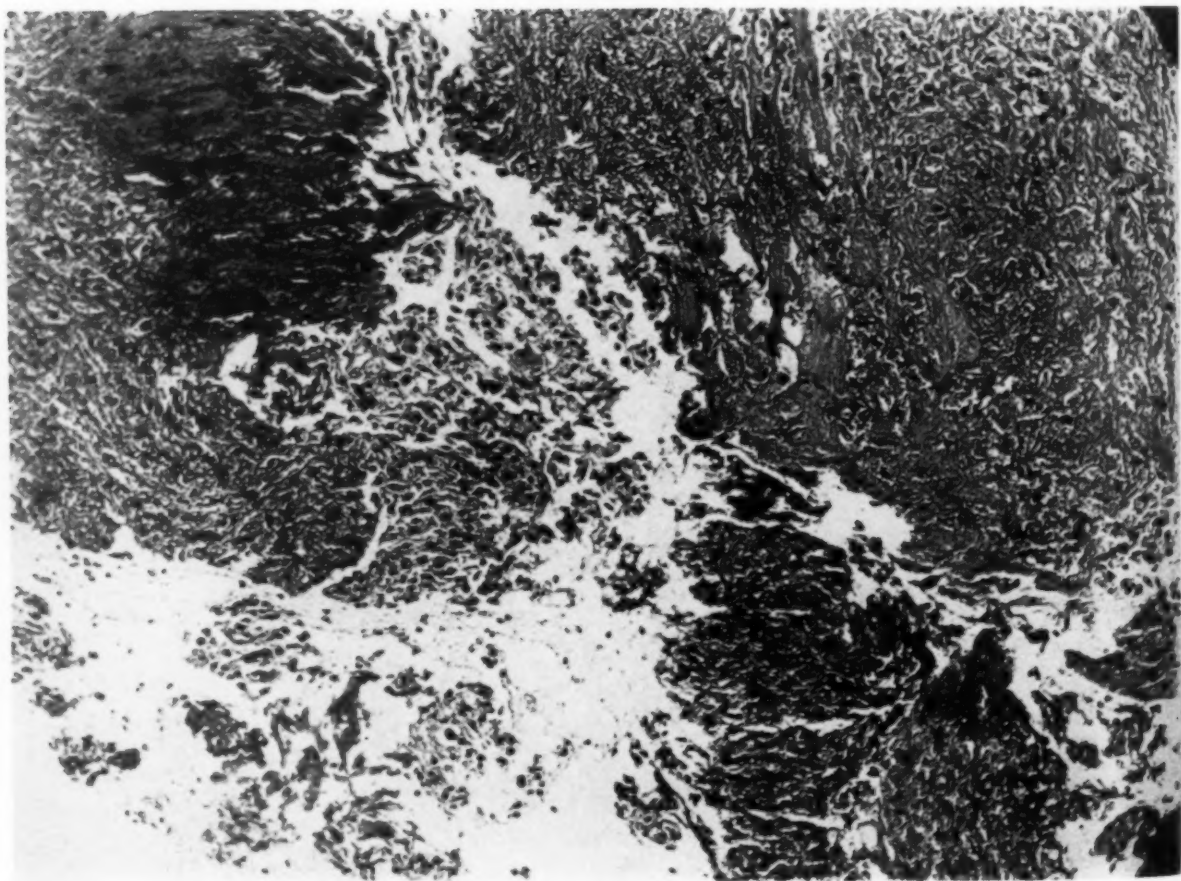
Fig. 2B

*Fig. 3A*

ber 56 (60%) were diagnosed as carcinoma. This method is indicated in those cases in which a tumor mass is visible on the x-ray and cannot be reached by the bronchoscope. It requires careful localization radiologically before the aspiration is performed. The tissue thus obtained is characteristic of the neoplasm and presents all the criteria of cancer present in the tumor within the lung.

*Case III*—S. T., a 55-year-old white male, entered the Jewish Hospital complaining of pains in the left shoulder of three months duration. Shortly after the onset of this pain, the patient noted that occasionally it would radiate down the left arm as far as the elbow. About two months before admission to the hospital, the patient developed a non-productive cough which has become progressively more disturbing. In the past few weeks the patient lost some weight.

Examination showed a well developed, well nourished, fatigued white male holding his left arm tenderly against the side of the chest. There was some fullness of the left supraclavicular area but no palpable glands.

*Fig. 3B*

There was some tenderness of the third rib anteriorly on the left hemithorax. On the left side of the chest there was impairment to percussion over the upper third of the chest both anteriorly and posteriorly. The breath sounds in this area were distant and accompanied by an occasional moist rale. The right lung and heart were essentially negative.

*Impression*—Tumor of the left lung with involvement of the left brachial plexus.

Roentgenogram of the chest (Fig. 3A) taken at the time the patient was seen in the chest clinic of this hospital was interpreted as follows: "There is an opacity involving the left apical region. It is noteworthy that there is no deviation of the tracheal shadow nor is there any approximation of the upper rib shadows on the left side. I do not believe that one can make a definite diagnosis of a malignancy on the basis of the present study."

In view of the location of the tumor it was thought best to perform a lung puncture for biopsy at once. The pathologist's report on the tissue thus obtained (Fig. 3B) was as follows: "There are several collections of small polyhedral and cuboidal cells in which the cytoplasm is indistinct and slightly acidophilic. The nuclei are irregular in shape, size and staining reaction. In one area these cells occupy a pink staining stroma, and in others the cells are loosely arranged. *Impression*—Malignancy."

Several days after the lung puncture the patient was bronchoscoped. The bronchoscopist reported the following: "The larynx was exposed with a Jackson laryngoscope and found to be negative. The bronchoscope was then passed and the trachea and bronchi explored in seriatum. Except for a small plug of mucous in the left upper lobe bronchus orifice, the findings were entirely negative."

#### *Exploratory Thoracoscopy*

Matson<sup>12</sup> has repeatedly called attention to the importance of exploratory thoracoscopy in the diagnosis of carcinoma of the lung. By this means one can locate, examine and remove representative tissue for biopsy. It is particularly valuable in those instances in which the tumor arises near the periphery of the lung and cannot be located through the bronchoscope. The tissue ob-

tained for biopsy by this means is representative of the neoplastic process and will contain cellular elements present in the tumor itself.

*Case IV*—J. G., a white female, aged 46 years, entered Kings County Hospital complaining of dyspnea and cough for an unknown period of time. Two years previously she was admitted to this hospital with pneumonia of the left lung. About three weeks before the second admission to the hospital she noted that the cough suddenly disappeared and that the dyspnea became more severe. At this time she began to have pain along the left lower costal margin. Examination revealed an acutely sick individual quite dyspneic, apprehensive and orthopneic. The right lung was essentially negative on physical examination. The left side of the chest was dull to percussion in its lower two-thirds. In this region the breath sounds were absent. The heart was slightly displaced to the right but was essentially normal in rate and rhythm.

*Impression*—Pleural effusion. Etiology unknown.

X-ray (Fig. 4A) taken shortly after entering the hospital, was interpreted as follows: "Absence of illumination of the left hemithorax with displacement of the heart and mediastinum to the right. The findings are

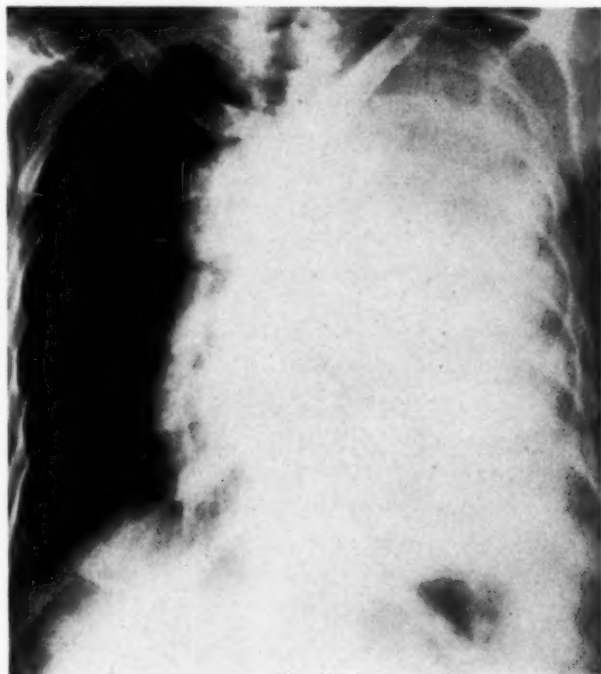


Fig. 4A



those of a massive left pleural effusion. The underlying lung pathology cannot be demonstrated."

Bronchoscopy performed several days later was reported as follows: "The lower portion of the trachea is deviated to the right. The right main bronchus is essentially normal. The left main bronchus was elevated and collapsed. The mucous membrane as far as could be seen was normal. *Conclusion*—Bronchoscopy ineffective in demonstrating an intrapulmonary lesion."

Several examinations of the pleural fluid failed to show the presence of malignant cells.

One month after entering the hospital the fluid was removed from the left pleural cavity and replaced by air. An exploratory thoracoscopy was performed. At this time it was noted that "the lung is irregularly collapsed, being adherent chiefly along the posterior chest wall. There was some brownish fluid present in the pleural cavity. Toward the upper portion of the lung and parietal pleura there was a cluster of nodules attached to

the posterior chest wall and visceral surface of the lung. In one of these nodular areas there was a deep ulceration. Manipulation of this area caused bleeding. Part of the ulcerated area was removed for biopsy." The opinion of the operator was that the tumor was malignant.

The pathologist's report on the tissue sent to the laboratory (Fig. 4B) was as follows: "Section of a small nodule of tissue shows the presence of a neoplasm of fibrous and myxomatous tissue in which the cells are spindle and fusiform in shape, sometimes occurring in whorl-like formation and in parallel rows. There are noted many alveolar-like spaces which appear to be lined by endothelium with a clear central portion. The cells are hyperchromatic, nuclei cannot be distinguished too well. Nucleoli are not visible. The cytoplasm is scant. The histology suggests malignancy."

The patient died several days later. A necropsy revealed a carcinoma of the left lung.

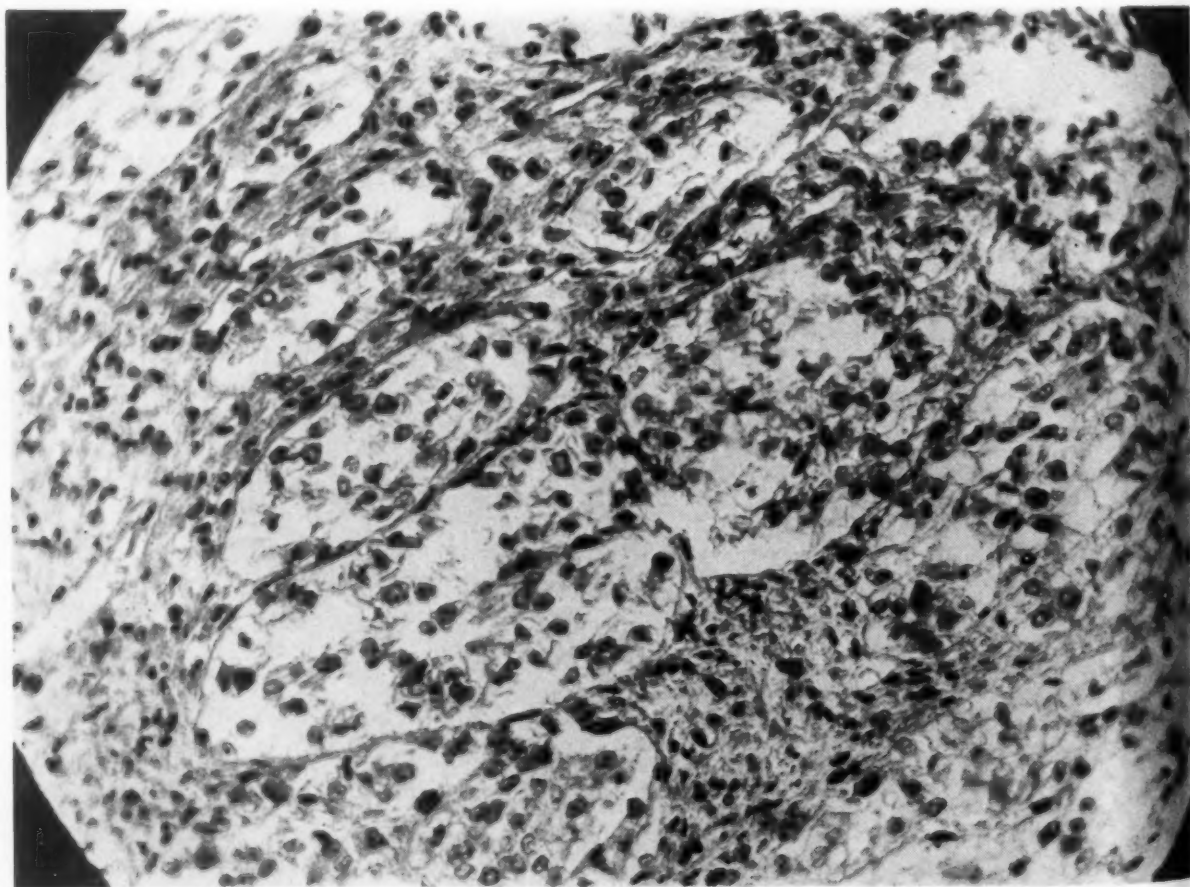
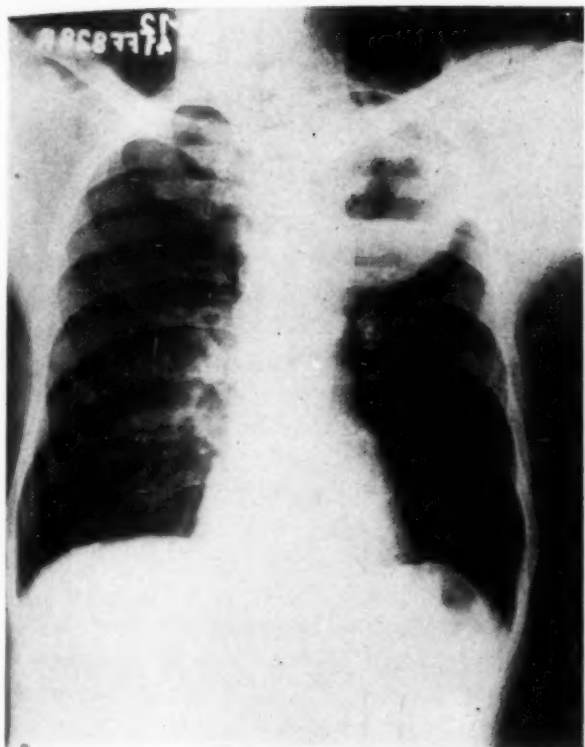
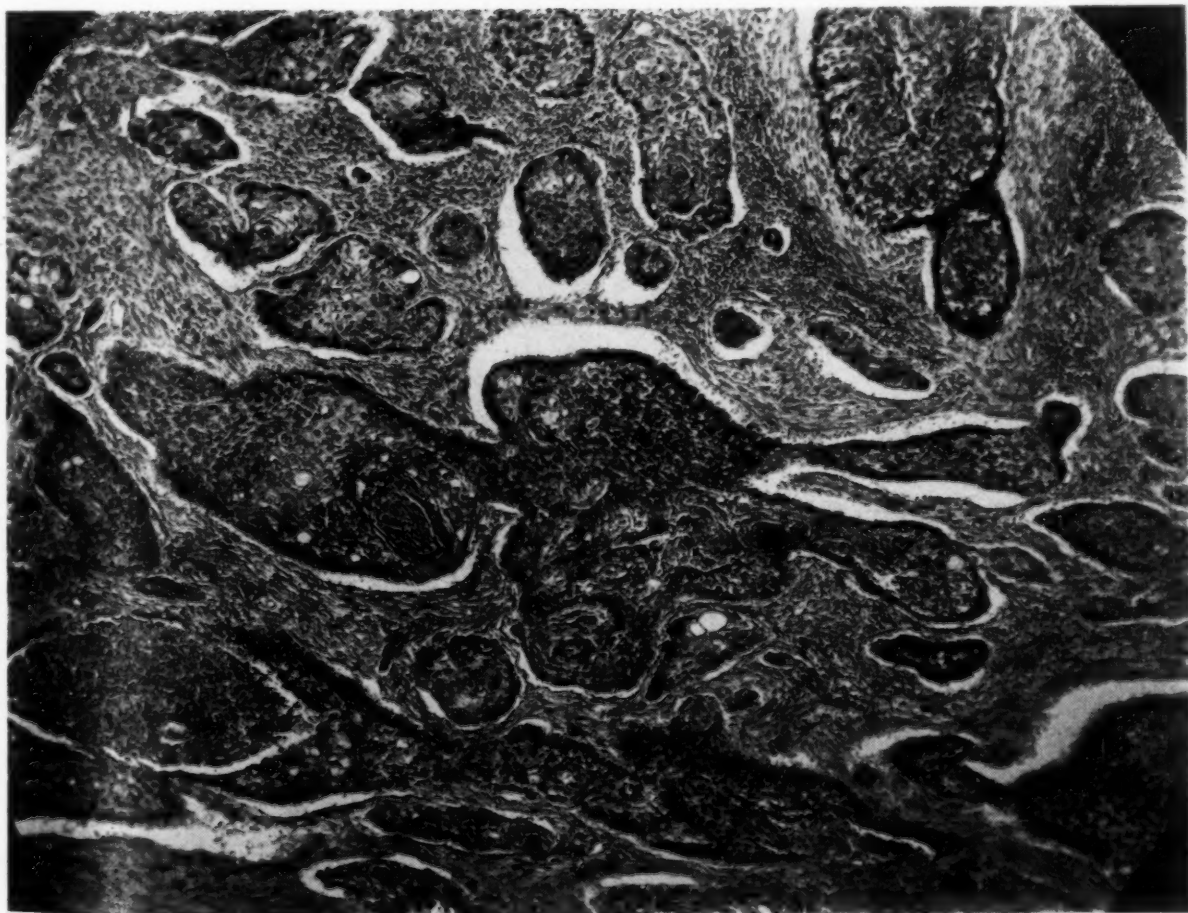


Fig. 4B

*Exploratory Thoracotomy**Fig. 5A*

This method is reserved for those instances in which there is a persistent clinical impression of the presence of a carcinoma of the lung in spite of the negative reports of the biopsies obtained by other methods. In 1912 Adler<sup>13</sup> stated: "As at the present the conscientious physician examines every chest for possible tuberculosis, so in the future every chest will have to be examined for possible tumor. The writer would go still further. Where all the means of diagnosis outlined in this little study fail, where there is suspicion of tumor, but no assurance is possible, there should be, it is emphatically here stated, as little hesitation in resorting to an exploratory thoracotomy as there is nowadays in submitting to an exploratory laparotomy." This procedure may be undertaken under local anesthesia. At the time of the exploration for diagnosis and to obtain tissue for biopsy, the possibilities of removal of the tumor may also be investigated. Since the tissue obtained for biopsy will be from the

*Fig. 5B*

neoplastic process, it will have all the cellular characteristics present in the tumor itself.

*Case V*—G. S., a 62-year-old colored male, entered Kings County Hospital with a history of cough for many years, expectoration (which was occasionally blood streaked) and loss of about 35 pounds in the past five years. About two months previous to entering the hospital, the patient suddenly developed sharp pains in the left chest, associated with which there were paroxysms of cough and hemoptysis.

Examination revealed a fatigued man poorly nourished and breathing somewhat rapidly. The right lung and heart were essentially normal. The left hemithorax was dull to percussion in its upper half. In this region the breath sounds were distant, bronchial and accompanied by scattered moist rales of various sizes.

*Impression*—Lung abscess, left upper lobe.

Admission x-ray of the chest (Fig. 5A) was interpreted by the roentgenologist as follows: "Evidence of a moderate sized area of lung destruction confined to the left upper lobe possessing a fluid level. Repeated sputum examinations and interval roentgenographic studies of the chest should be made to exclude the possibility of an underlying tuberculosis. Diagnosis deferred."

About one month later the patient was bronchoscoped. The report of the bronchoscopist read as follows: "In the left main bronchus half inch below the carina on the inner bronchial wall the mucosa was red, slightly thickened and had a granulomatous appearance. Very little excretion was noted. The opening to the left upper lobe was narrowed and had the appearance of a thin layer of white exudate over it. No definite discharge was seen. No true tumor mass was seen. *Diagnosis*—deferred."

Several weeks later an exploratory thoracotomy was performed under local anesthesia. A transverse incision was made on the anterior chest wall, corresponding to a line over the third rib and extending from the sternum to the anterior axillary area. The third rib was resected subperiosteally. Tumor tissue could be palpated through the posterior periosteal bed. The parietal pleura was then incised exposing the lung and tumor tissue. The lung was then palpated in all directions. It was found to be infiltrated with tumor tissue as far as the exploring

finger could feel. Within the mediastinum there were palpable several firm areas characteristic of malignant nodules. Surgical removal of the neoplastic process was not advisable because of the mediastinal involvement. Two pieces of representative tissue were removed for biopsy.

The pathologist reported on the tissue (Fig. 5B) as follows: "Section of the soft tissue shows the presence of neoplasm composed of alveolar-like masses of large ovoid shaped cells. Many of the cells show hyperchromatic nuclei. These areas are separated by a dense fibroblastic stroma. Areas of keratinization and attempts at pearl formation are noted in the tumor. *Diagnosis*—Epidermoid Carcinoma."

### Conclusions

Five accessory methods are discussed which may be of help in the earlier recognition of carcinoma of the lung. Exemplary cases are presented in which the diagnosis could not be arrived at by any other means.

135 Eastern Parkway

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## Wheezing, Bronchial Ulcers and Atelectasis\*

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A very troublesome syndrome, namely, wheezing, bronchial ulcers, and atelectasis, when present in sanatorium patients, has become increasingly significant, especially since it has reared its head at a time when the mortality rate of pulmonary tuberculosis is at its lowest in the history of the disease. I believe this entity will tend to modify the prognosis of many a case and will alter a few well-established therapeutic concepts as we know them today.

Bronchoscopy is indicated in nearly all cases in which a diagnosis of tuberculous tracheobronchitis can be reasonably suspected. It is to be suspected in every case of pulmonary tuberculosis that has wheezing as a symptom, and in every case where atelectasis is evident from the x-ray, and also in patients who apparently have an adequate collapse, as shown by x-ray, but where sputum is persistently positive. Further, it is to be sought for in those cases with positive sputum but negative x-rays, as emphasized by Ornstein and Epstein<sup>1</sup>. However, bronchoscopy is not indicated in terminal cases too ill to be subjected to the discomfort, merely to confirm a diagnosis.

Wheezing can be very annoying and usually persists after all sputum has been raised. Jenks<sup>2</sup> states that it is the most common symptom associated with tuberculous tracheobronchitis. It may appear as an original symptom, or make itself evident after some form of collapse therapy has been induced. Samson<sup>3</sup> reports a series of 17 cases, 16 of whom received collapse therapy of one sort or another, in which one-half of the lesions in the trachea and bronchi did not develop until after the induction of collapse. In a series of 52 cases, here presented, a similar occurrence was observed. Out of the 52 patients, 27 wheezed from the beginning and prior to collapse, while 7 began to wheeze after pneumothorax was started, 10 after thoracoplasty, and 3 after pneumolysis had

been performed. That ulcers of the bronchus may be present without wheezing was demonstrated when 5 were so found in patients who denied having ever wheezed. While I cannot definitely say that there were no lesions present prior to collapse in these cases, for only two were bronchoscoped before the induction of collapse, I can say that collapse therapy aggravated and brought forth the symptom of wheezing.

The use of the bronchoscope to determine the presence of tuberculous tracheobronchitis has gained momentum rapidly at the Rutland State Sanatorium since the beginning of 1937. Fifty of the 52 cases reported on here were seen since 1937, and through bronchoscopy were proved to have tracheobronchitis. The other two cases were discovered in 1934 and 1936. The fifty represent 5 per cent of the total admissions in the four years from January 1937 to January 1941. Routine bronchoscopies were not done because many patients, although they had suggestive symptoms, were too ill to be subjected to this procedure. If these had been bronchoscoped, the total might have approached the 11 per cent found by McIndoe, Samson, Anderson and Leslie<sup>4</sup> in their routine bronchoscopies on 272 patients, and even the 24 per cent reported by Myerson<sup>5</sup> may be nearer the correct incidence of tracheobronchitis.

Although one might expect to find tuberculous tracheobronchitis mostly in the far-advanced cases, this series showed that in one case it appeared with no pulmonary lesion; it was found in 5 minimal, 23 moderately advanced, and 23 far-advanced cases.

Many investigators have found the incidence of tuberculous tracheobronchitis greater in females than in males. In the group here reported this was confirmed by the finding of an 80 per cent preponderance of females.

Tuberculous tracheobronchitis may occur at almost any age. In this series there were three cases between 15 and 19 years, 19 cases between 20 and 24, 12 cases between 25 and 29, 10 cases between 30 and 34, 5 between 35 and 44, and 3 from 45 years upward.

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Jenks<sup>2</sup>, in his admirable review of the subject *Tuberculous Tracheobronchitis*, sets forth the classification of bronchial lesions as described by the bronchoscopist.

Following that classification, our cases were grouped as follows:

*Non-ulcerative, Non-stenotic, with Edema*

Six of our series of 52 cases of tuberculous tracheobronchitis belong in this group. Of this number, 3 had wheezing among their original symptoms; the other 3 began to wheeze as follows: one after pneumothorax, one after pneumolysis, and one after thoracoplasty. All had atelectasis demonstrable by x-ray, which is surprising in view of the non-ulcerative character of their tracheobronchitis. Follow-up showed three dead with an average duration of life of 16 months after the diagnosis was made. Two were quiescent with an average duration of observation of 22 months. One was considered improved after 6 months observation.

*Hyperplastic, Granulomatous, or Tuberculous Tumor*

There were two patients in this group. Wheezing appeared among their original symptoms. Atelectasis, which would naturally be expected, was demonstrated by x-ray. The outcome here was one dead 15 months after diagnosis was made and one unimproved after observation for three months. The latter patient left the sanatorium against advice.

*Ulcerative Lesions*

There were 42 patients in this group. An interesting and unexpected fact came to light when the correlation between bronchial ulcers and atelectasis was noted. Only 25 of the 42 (60 per cent) had accompanying atelectasis.

*Fibrostenotic Group*

There were two patients with very definite fibrostenosis; one had complete closure of the main bronchus with atelectasis, the other only partial, without atelectasis at present. The former is dead, 19 months after the diagnosis was made, while the latter is unimproved after 23 months of observation.

In 1932 Stivelman<sup>7</sup> stated that lobar or multilobar atelectasis in the course of arti-

ficial pneumothorax is apparently a beneficial process and leads to a better collapse and early fibrosis of the treated lung. This view has been held by many, but the presence of tuberculous tracheobronchitis will tend to modify the good that can come from artificial pneumothorax. In this series 27 had artificial pneumothorax. Atelectasis was present in 22; 8, or 26 per cent, of the latter became definitely worse following the induction of pneumothorax; 7 were uninfluenced; 4 were improved, while 3 were made worse only after re-expansion of their pneumothorax. I should like to cite two interesting cases where atelectasis in the course of artificial pneumothorax proved disastrous.

*Case I*

T. F. was a 27-year-old, single, white Greek female. The onset of present illness began in January 1933 when she started to wheeze. X-ray showed a lesion in her right lung, and bed rest was instituted. She did well until 1935 when she began to wheeze again. A check-up x-ray showed bilateral spread of the disease. Artificial pneumothorax was started on the right side and maintained for four months, but the wheezing persisted. Then artificial pneumothorax was started on the left side and maintained for three years. Because of persistence of symptoms and elevated afternoon temperature which rose to 103° F., the patient was sent to the Massachusetts General Hospital. Bronchoscopic examination there revealed tuberculous bronchial ulcers and stenosis of the left major bronchus. She was admitted to Rutland on Oct. 3, 1939. Repeated bronchoscopies showed complete stenosis of the left major bronchus with tumor in the latter. It was impossible to dilate the bronchus at any examination. Surgical consultant\* recommended left pneumonectomy, as the x-ray showed complete destruction of the left lung. This was done on April 1, 1940, with uneventful convalescence after the first three days. Sputum, which was positive on direct smear from the date of entry, turned negative after the operation. Three months later the patient began to complain of wheezing, coughing and raising. Her temperature began to rise; the sputum turned positive, and

\* Dr. Edward D. Churchill, Mass. General Hospital, Boston.

x-ray revealed a tuberculous pneumonia in the right lower lobe. The patient slowly went downhill and died one year after pneumonectomy.

*Comment*—In spite of the discouraging end result in this single case, pneumonectomies will probably be done in increasing numbers for similar cases. The original symptom of wheezing caused the patient to seek medical advice. Pneumothorax not only failed to give her relief, but made her worse.

### Case II

M. M., a 20-year-old, single, white female, contact to mother, was admitted to Rutland State Sanatorium on May 21, 1937. She was diagnosed as Stage I pulmonary tuberculosis, bilateral. Bed rest was instituted for four months, then because pathology showed a slight spread bilaterally, pneumothorax, maintained for two and one-half years, was started on the right side first. Artificial pneumothorax on the left was started six months after admission. Two months later a left intrapleural pneumolysis was performed. Sputum, which was positive by guinea pig inoculation on admission, was positive on two cultures within two months and then positive on direct smear four months after entry. The patient noted wheezing shortly after pneumolysis. The x-ray showed a 65 per cent collapse on the right with 100 per cent collapse on the left, which was interpreted as complete atelectasis of the left lung. Because of continued positive sputum on direct smear, in the presence of adequate pneumothorax, bronchoscopy was done. This revealed an ulcer in the left major bronchus. With repeated bronchoscopies using electrocautery the ulcer was reported healed only to break down elsewhere. On Dec. 31, 1939, the patient developed a severe pneumonitis in the left lung and ran a stormy course for three weeks. Recovering from this episode, a first stage thoracoplasty was performed followed by a second stage after two months of convalescence. In view of the complete occlusion of the left major bronchus, pneumonectomy may have to be done sometime in the near future. This case illustrates the difficulty one may get into in the presence of bronchial ulcers of the stenotic type. On reviewing the above, pneumolysis in the presence of a bronchial ulcer led to a

tragic result.

*Comment*—The x-ray of the patient's chest showed a minimal lesion in each lung below the clavicles. While atelectasis may have aided the fibrosis of the tuberculous lesion in the upper lobe, the concurrent atelectasis in the healthy lower lobe was a disaster, for in its train followed repeated infections of that lobe with its ultimate destruction. Therefore, in the presence of a bronchial ulcer, pneumolysis should have been deferred. The pneumothorax on the right never produced atelectasis, and when it was abandoned, the small lesion was healed. Caution in the application of pneumothorax and pneumolysis in minimal cases is advisable in the presence of stenotic lesions of the major bronchus.

### Treatment of Bronchial Ulcers

In the treatment of bronchial ulcers, chaulmoogra oil was employed at first but met with little success. Jackson used this oil in his original treatment of these ulcers and was not enthusiastic about the results.

The present vogue in treatment appears to be electrocautery. At the Rutland State Sanatorium, the bronchoscopist, G. Arnold Rice, has been using this method since 1937.

On classifying the 52 cases with tuberculous tracheobronchitis, 44 were found to have bronchial ulcers. Of these, 24, or 55 per cent, were healed by electrocoagulation, which was done at intervals of from two to four weeks. Warren, Hamond, and Tuttle<sup>9</sup> reported 59 per cent healed in a series of 57 patients. Samson<sup>10</sup> also reports satisfactory results with electrocautery. The least number of bronchoscopic treatments needed to heal an ulcer in this series was four, while the maximum was twelve. Bronchial ulcers show a definite tendency to heal, only to break down in an adjacent part of the bronchus. This occurred once in 5 patients and 4 times in one patient (12 per cent). The ulcers originally treated were reported as remaining healed in these recurrent cases. The average period during which the 24 cases with bronchial ulcers remained healed was 14.5 months.

Twenty, or 45 per cent, were reported unhealed. However, six of these patients died from their pulmonary disease. Fourteen are unimproved. Six of these patients have been limited to one bronchoscopic treatment due



to the poor prognoses. The other 8 are still under treatment.

What is worthy of our attention are the 4 patients whose ulcers have been reported healed, and yet who, because of their continued wheezing, coughing and expectorating, are unimproved. This is due to the stenotic condition of their bronchi, making for poor drainage. Furthermore, these patients probably have active ulcerations beyond the stenoses and beyond the vision of the bronchoscopist as recent autopsies at Rutland have demonstrated. Therefore, the mere healing of ulcers, although desirable, is not all; we must look beyond this and evaluate the degree of stenosis that the healing left in its wake. On this factor should therapy be based.

#### *Effect of Collapse Therapy*

The effects of treatment were interesting. Fourteen of the 52 patients were made worse by collapse therapy; 10 by artificial pneumothorax; 4 by thoracoplasty. Fourteen were uninfluenced by any form of treatment. When 27 per cent of the patients are made worse, caution should be used before any of the accepted methods of treatment are applied in cases complicated by tuberculosis tracheobronchitis.

Ornstein and Epstein<sup>1</sup> have recommended pneumothorax in all cases where there is little or no pulmonary disease present, so as to safeguard against infection of the lung from bronchial lesions. From the rather discouraging end results in this series, I find myself agreeing with most observers who are of the opinion that in the presence of ulcerations, collapse therapy should be withheld until healing of the ulcers without significant fibrostenosis can be demonstrated. Especially is this view applicable in minimal cases. (See Case II).

#### *End Results*

The end results of 52 patients with complicating tuberculous tracheobronchitis showed that 12 (23%) were dead, 16 (31%) were unimproved, 13 (25%) improved, while 11 (21%) were quiescent over an average length of 2.9 years. Contrasting this with the end results after a similar period in an uncomplicated group in the same stage of disease, and treated by the same methods, there were 3 (5.7%) dead, 3 (5.7%) unimproved, 3 (5.7%)

improved, 27 (52%) quiescent, 12 (23%) apparently arrested, and 4 (7.7%) arrested. With 23 per cent dead in the tuberculous tracheobronchitis group as compared to 5.7 per cent dead in the uncomplicated group, the prognosis in cases complicated by tuberculous tracheobronchitis is much graver.

Eloesser<sup>2</sup> was, I believe, among the first to understand the nature of the complications resulting from ulcerations of the bronchus, for he states that it seems not impossible that the atelectasis and fibrosis which follow any form of collapse therapy, even pneumothorax or phrenicectomy may lead secondarily to persistent deformity, which in turn may cause stenosis of the larger air passages. He wrote in 1934: "It is doubtful whether more of them (stenotic cases) may not have been harmed; whether partially stenotic bronchi may not have been closed off entirely by collapse therapy."

Ordinarily, compressing purulent secretions behind a blocked outlet is not considered a rational way of treating a suppuration; neither is it a rational way of treating an infected stenosed lobe, according to Eloesser. He recommends drainage of a stenotic lobe or its removal, a procedure which will become increasingly frequent as more of these cases are reported and the technique of lobectomy improved.

#### *Summary and Conclusions*

1) Wheezing was reported in 90 per cent of a series of 52 patients with tracheobronchitis at Rutland State Sanatorium.

2) Tuberculous tracheobronchitis appeared preponderantly in the females of this series.

3) Tuberculous tracheobronchitis was found more frequently in the age group under 35, but may appear at any age.

4) Atelectasis may be present in conjunction with the non-ulcerative type of lesion, probably due to edema and prolonged spasm of the bronchioles.

5) Atelectasis is not necessarily found in the ulcerative type of bronchial lesion.

6) Twenty-seven per cent became worse after collapse therapy.

7) In this series of 52 cases complicated by tuberculous tracheobronchitis 23 per cent were dead; 31 per cent were unimproved at the end of an average of 2.9 years.

8) The end results in an uncomplicated

series of 52 cases in the same stage of disease, treated over a similar period of time with the same therapeutic measures, was 5.7 per cent dead, and 5.7 per cent unimproved.

9) Conservative treatment should be practiced by withholding collapse therapy until the bronchial ulcers are healed, especially in minimal cases. Lobectomy or pneumonectomy is the procedure of choice in complete stenosis.

10) Twenty-four of the 52 cases with bronchial ulcers, or 46 per cent, were reported healed with electrocautery.

I wish to extend my thanks and appreciation to Dr. Alton S. Pope, Director, Division of Tuberculosis of Massachusetts and Dr. Ernest B. Emerson, Superintendent, Rutland State Sanatorium, for their assistance.

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## Tuberculosis' First Line of Defense

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Were the present era in our American life to be labeled, surely it would incorporate the term defense. Attuned to, and somewhat in keeping with, that idea; I have incorporated the word in this article: *Tuberculosis' First Line of Defense*. I felt I could offer a more instructive, a more constructive, message by discussing defense in tuberculosis rather than tuberculosis in defense.

Parenthetically, I can say regarding the latter, that our government is today still spending about \$3,000,000 every month in medical care, benefits and claims, arising from tuberculosis of the last war. Steps are being taken, and efforts are being made, to avoid in the present emergency, the errors which resulted in this expenditure. Toward this end, an extensive or universal employment of the x-ray examination of the chest of all recruits is planned—and being put into operation. Also, more importance is being given the exogenous theory of the production of reinfection tuberculosis or, in other words, there is a greater appreciation of the contagious nature of this disease.

The patient sick from tuberculosis, in the

vast majority of instances, is first seen not by the specialist, not by the sanatorium physician, not by the health officer—but by the general practitioner, the family doctor. So veritably, he becomes the first line of defense. The strength of this bastion, this outer rampart, needs to be bolstered. That this is so, is revealed by the fact that 80 per cent of patients on admission to the sanatorium are in the advanced stages; and by the fact that, today, tuberculosis is the leading cause of death in the age group 20-40. This, then, is the challenge of stark reality; and one that must be met. With this in view I should like to give a brief consideration of a few of the practical phases of our problem.

Most probably you have heard, and heard stressed repeatedly, the value of early diagnosis. This is as it should be. An early tuberculosis is, indeed, the most readily curable of the chronic diseases that produce death. I need not remind you of the dire catastrophe that late phthisis portends. Except for the very occasional case, the time to make the diagnosis of really early tuber-

culosis is in the pre-symptom stage. Symptoms mean an advanced or advancing disease.

That the diagnosis of early tuberculosis, the diagnosis before symptoms appear, is a practical reality has been amply and strikingly shown in the case-finding campaigns among apparently normal and healthy subjects. The tuberculin test and the x-ray examination have largely made this possible. The former detects the presence of tubercle bacilli a few weeks after their entrance into the body and the latter may reveal lesions in the lungs months before any clinical suggestion of their existence is manifest.

The tuberculin skin test is a most valuable one and, when done properly, approaches in accuracy and precision any test we have in medicine. In the sphere of differential diagnosis, a negative tuberculin test largely eliminates tuberculosis from consideration. A negative test in the presence of active or clinically significant disease is rare. A positive test means only that there are tubercle bacilli somewhere in the body and does not indicate whether or not there is disease. There is no correlation of the intensity of the reaction with the findings in the lungs. An important reason for the tests is the economic saving. It screens out those individuals in whom no further examination is demanded. A positive test in infants and very young children is most significant, as it very strongly indicates that there is an open case of tuberculosis in the household or among the immediate contacts of this child.

Many cases of tuberculosis have been found in this manner. Rather striking has been the frequency with which these discovered cases have been shown to be the grandparent or uncle or aunt who was afflicted with so-called chronic bronchitis. It is well to bear in mind that in the latter decades of life, tuberculosis is rather prone to run a benign course and more closely resemble a chronic bronchial disorder than the case of phthisis as we usually picture it. These patients are notorious spreaders of tuberculosis, and should be by one means or another (treatment, segregation or meticulous instruction) eliminated as such.

The tuberculin of choice is the P. P. D. (purified protein derivative) because it is the most stable, most standardized and most ac-

curate. The performance of the tuberculin test should be a part of every doctor's routine in making a general examination.

The one outstanding, the most important method of examination for pulmonary tuberculosis is the x-ray examination. To be so, it demands that it be satisfactorily made. A poor film not only gives less information, it may even be misleading. A lesion in the lung can be demonstrated better and earlier by the x-ray than by any other known method. No patient has been thoroughly examined for tuberculosis without the use of the x-ray. No collapse treatment should ever be attempted in which x-ray study was omitted. In selected cases, fluoroscopic examination may be substituted; but only after considerable proficiency with this procedure has been attained. The combination of the two gives us the best results. The chief drawback to the x-ray examination is, of course, the expense. This problem may be largely solved with the increasing development and use of the paper roll film and the small 4 x 5 film. We are grateful to the Health Departments for the aid being rendered by the traveling x-ray clinics.

We have lived to see the physical examination, as a means for diagnosing pulmonary tuberculosis, dethroned. It still has its value, however, and should not be neglected or discarded. We must not, on the other hand, be blind to the fact that, even in expert hands, the diagnosis can be made by this means in only about 25 per cent of the cases. The most valuable physical sign in pulmonary tuberculosis is the presence of persistent rales following the expiratory cough in the upper reaches of the lungs.

While it would be ideal to always make the diagnosis of tuberculosis in the pre-symptom period, this is, after all, only an ideal. So in many, if not most, instances, we are confronted with symptoms. You know them well, so just a comment or so on a few of them.

A chronic cough may be due to many things, but it is commonly due to tuberculosis of the lungs. Therefore, every chronic cough should be investigated and explained. If this cough is productive, examine the sputum and examine it repeatedly. The sputum examination for tubercle bacilli is so all important, and yet so simple. A microscope, glass slides and a few small bottles of stain



are all that one requires. Permitting the sputum specimen to stand for 24 to 48 hours on the laboratory or office shelf until it becomes thin often yields a more abundant find of the bacilli.

I still see too many patients who were told by their doctor that the small amount of blood coughed out, came from their throats. Except post-operatively, the throat is rarely the cause of blood spitting. The common cause of hemoptysis or blood spitting is tuberculosis; and should be so considered until, or unless, proved otherwise. Hemoptysis is very frequent in bronchiectasis, lung abscess and carcinoma of the lung; but these diseases are relatively uncommon.

Acute pleurisy, particularly the wet or pleurisy with effusion, is due to a tuberculous infection in the vast majority of instances. Unless you find another satisfactory explanation for the pleurisy, consider it tuberculous and treat your patient accordingly. Do not dismiss your pleurisy patient as soon as the acute condition clears. If an examination at the time—and this should include x-ray—shows the lungs clear, the patient should be put on a rest regime of a few to several months as though he had a minimal or incipient lesion in the lungs. This should be followed by periodic chest examinations down through the years. Advanced tuberculosis can be prevented by doing this.

Amazing strides have been made, and are today in the making, in the treatment of

tuberculosis. This is largely due to the era of collapse therapy which is now in full cry. Do not be too ready just to pack your patient off to bed after giving him a tonic or a box of vitamin pills and the advice to eat heartily, drink lots of milk and throw open the windows. There are very few cases of established pulmonary tuberculosis that cannot be helped in greater or lesser degree by some form of collapse treatment. Many new procedures are constantly being developed. Artificial pneumothorax continues to enjoy the favored role. Extrapleural thoracoplasty is on the ascendancy while it would seem that the star of phrenectomy has set. Do not overlook the possibility that collapse therapy may help your patient.

Finally, in doing his part in the great campaign against tuberculosis, every doctor should boost the Christmas Seals sale and should support laudable legislation, of which there is much needed.

In conclusion, I do hope that I shall leave with you some thoughts that may prove a help to some of your patients of the present or to those of the future who suffer from tuberculosis. We believe today that we possess the knowledge and potentialities for pulling to rein the grim apocalyptic rider. There remains only the ways and means for applying them. In a large measure, this rests with the general practitioner—the first line of defense.

478 Peachtree Street, N. E.

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PAUL H. HOLINGER, M.D.  
*Secretary-Treasurer*

## The Story of Treatment in Pulmonary Tuberculosis

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In considering any form of treatment of pulmonary tuberculosis, be it medical or surgical, the principles involved remain the same, the only difference lies in their degree of application. The first consideration is the attempt to lessen toxic absorption, and this is done by slowing the circulation and lessening the movements of the lung. Healing of tuberculosis takes place either by resolution, or by fibrosis and calcification, but it is a known biological fact that healing does not occur until the toxicity of the lesion has been abated. If diagnosis has been made before tissue defects have occurred, we should immediately institute what has become known as the Rest Regimen, and it is desired that more doctors become familiar with this regimen. The most important factor is bed rest, absolute bed rest, twenty-four hours of the day. Many patients have lost their opportunity to get well by sacrificing rest in the beginning so that it becomes of the utmost importance to make the diagnosis early and to institute bed rest immediately.

Starting with the patient upon whom the diagnosis has been made for the first time, and let us assume, in a very early stage—so early that the patient is entirely asymptomatic—there is one and only one treatment indicated, bed rest, absolute bed rest, not getting out of bed for any purpose. It is a very difficult task to get the cooperation of such patients. They have no symptoms, their sputum is usually negative, and they usually feel perfectly well. In order to insure results, bed rest must be absolute and must be continued for a long time, six months as a minimum, but more often a year. In the past, the guide to the length of time the patient was kept upon bed rest, was the return of his temperature to normal, together with the disappearance of other subjective symptoms. After this had been accomplished, he was allowed graduated exercise. The tendency here was to allow the patient up too soon with the result that his lesion neither resolved nor became stabilized. The only guide as to when to allow such a patient out of

bed is the x-ray. As long as absorption of the lesion continues, he must remain in bed, and only after no x-ray change has been demonstrated over a period of three to four months, can we assume that the disease has become stabilized, after which the patient may be allowed up, but still kept under close observation for the next year or two. Unfortunately, the minimal lesion without symptoms occurs in much the smaller half of cases diagnosed, the greater half possess symptoms at the onset.

Probably the most common syndrome is cough with fever and general malaise. Many patients with this complaint do not seek the doctor's advice in the beginning because of the very nature of their complaint and the fact that a suitable cause is so easily found. It is this type of onset that accounts for so many cases becoming moderately or even far-advanced when first diagnosed.

Pleurisy with effusion as a mode of onset is manifest in a high percentage, possibly as high as 20-25 per cent. Occasionally in the beginning, there is some chest pain, and this usually serves to alarm the patient with the result that medical aid is sought. So important is the treatment of this mode of onset that I shall give it more consideration later on.

Hemoptysis is a frequent first symptom, often occurring in patients in apparently good health, and at times is apt to be dismissed as of little importance, or as having come from the throat; more often, however, hemoptysis serves to bring the patient to the doctor, and inasmuch as genuine spitting of blood comes from the lungs, and in 90-95 per cent of cases is due to tuberculosis, a diagnosis with hemoptysis as a mode of onset is more often confirmed.

The treatment for all types of disease, be it minimal, moderate or even far-advanced, should at the onset be Bed Rest. Rest treatment naturally brings up the question of climate which in the popular mind has long been considered an essential part in the treatment of tuberculosis. Climate has been as-

sociated with the treatment of tuberculosis since early times. The fact that tuberculosis is a disease of the lungs and that the air we breathe enters the body through the lungs, has given rise to this popular association. While a favorable climate may be important, it is not essential. It has been claimed that altitude is important because it increases the red cells and lymphocytes in the blood, but the fact that rarified atmosphere increases respiration makes altitude undesirable. Freedom from respiratory infection is probably more marked in the drier climates and away from centers of population where the chances of contact with infection are lessened. Changes of climate have a very beneficial effect upon both the sick and the well, but too often we see patients chasing from one climate to another in the hope that they will find a "suitable" climate especially fitted to the cure of their disease. Too often the result is the opposite.

Symptomatic therapy is an essential part of the rest regimen. The best plan is to meet the various conditions by management and by rest, rather than by medication. However, there are some symptoms of tuberculosis which call for special attention. In the first place among these is hemorrhage.

Pulmonary hemorrhages we might divide into three groups: streaking of the sputum, the mild and moderate hemorrhage, and the profuse hemorrhage. Streaking of the sputum does not call for any special treatment while moderate hemorrhage must be taken more seriously. The patient should be at complete bed rest until all signs of bleeding have ceased. Mild sedatives may be given but morphine is not indicated. Profuse hemorrhage is relatively uncommon. Here, too, the patient should be confined to bed, propped up on several pillows rather than lying flat, because in this position it is easier to cough and clear the blood from the bronchi. Morphine should not be used because it leads to the retention of blood within the lung and the resulting spread of disease. The use of shot bags through restriction of motion sometimes appears to be of some help.

Calcium lactate and sera are used but are not of very much benefit. Artificial pneumothorax is at times the only procedure which will control severe bleeding.

*Medical Treatment*—Calcium has been used

extensively, the theory lying in the fact that calcium is necessary to the healing of the lesion. In practice, however, the treatment has proven of no value, in part due to the rapidity with which calcium is excreted. The idea that cod liver oil has a specific effect upon the disease still exists; its only value, however, lies in the fact that it provides concentrated fat soluble vitamins.

*Creosote*—There is no evidence whatsoever that creosote has any effect. In fact, it upsets the digestion and its use is to be condemned. Iodine has been used widely and while it might have some effect upon the associated bronchitis or secondary infections, it may do actual harm.

*Sulfanilamide* and its various derivatives have all been tried and no beneficial effects observed.

*Sun Baths*—While these may have a very beneficial value in surgical tuberculosis, and while some time ago the sun was used in the treatment of pulmonary tuberculosis, it is now known that this is distinctly harmful. There is a tendency to overstimulation and possibly activation of an apparently healed lesion. There also seems to be a tendency to produce hemorrhage. The use of the sun or artificial sunlight is therefore contraindicated.

Now we come to those who progress in spite of bed rest, whose sputum becomes or remains positive, and whose lesion excavates. Some form of collapse therapy is indicated and artificial pneumothorax is the method of choice.

Artificial pneumothorax should not be instituted on every unilateral case, its main indication should be the presence of a cavity, plus a positive sputum, in a patient who has first been given a trial on bed rest and has failed to respond. It should be instituted as a hospital procedure and not as an ambulatory one. A positive sputum should first be obtained in order to insure against the possibility of collapsing other conditions not due to tuberculosis, such as a lung abscess or an atypical pneumonia. The ideal case for collapse is naturally the unilateral one, but we do not consider that the unilateral case is the only one which responds to artificial pneumothorax. It is not generally appreciated that in cases of bilateral disease more pronounced on one side than the other,



collapse of the diseased side usually shows clearing in the process of the uncollapsed side. The reason for this is probably that the institution of collapse of the more diseased lung prevents a certain amount of toxic absorption and, in addition, by virtue of the collapse, there is possibly a certain restriction in motion even of the uncollapsed side.

It is often necessary to employ this method of treatment in bilateral disease in those cases which, when seen for the first time, have bilateral cavitation. Collapse may here be tried first on one side, and subsequently on the other, or as we sometimes see, collapse of the contralateral lung has to be initiated some years after collapse of the original lung, by virtue of the lighting up of some previously quiescent lesion on the contralateral side. Bilateral collapse may be maintained simultaneously, or the originally collapsed lung may be reexpanded and the contralateral one collapsed. The reserve pulmonary function is such that it is possible to collapse each lung slightly more than half its volume.

Perhaps a few words about complications of pneumothorax are in order. It is because of such complications that the effort to heal your patients by bed rest should always be tried first. The most common complication is the development of fluid. This fluid may be small in amount or large, it may be clear or cloudy, thin or thick. It occurs in some form in practically 100 per cent of all pneumothorax cases and its treatment varies. This fluid, while potentially arising from tuberculous empyema, is not so considered until the effusion becomes thick. In most instances, it causes little or no trouble—no trouble if small amount and clear. In other instances, its removal is necessary, especially if large in amount and cloudy. If not removed, it may by the deposit of fibrin and the production of adhesion, so interfere with the collapse as to necessitate its abandonment. It must be realized that the presence of fluid does not serve to keep a pleural space. The lung has a tendency to creep out through the fluid, the formation of adhesions causing, by traction, a loss of space. Removal of fluid at other times becomes necessary to relieve mechanical embarrassment.

Fluid may become secondarily infected

either from within or without. If the infection can be controlled by the injection of dyes, such as crystal violet, or other chemotherapeutic agents, well and good. If not, open drainage becomes necessary with the resultant long delay in healing of the drainage tract. If the fluid becomes really thick, the consistency of creamy puss, and does not respond to repeated tapplings and washings, it becomes necessary to consider obliterating the pleural space by thoracoplasty, and even with a thoracoplasty, a small space filled with pus always remains in the region of the lumbar gutter. In a series of 100 pneumothorax cases which I reviewed a while ago, 8 per cent developed tuberculous empyema, and of this number, four came to thoracoplasty.

The problem of the unexpanded lung is important. It is most apt to occur in the pneumothorax case carried on too long, although it may occur in others. The average time thought necessary to maintain collapse, in order to bring about healing of the lesion, varies from 3 to 5 years. In cases carried on longer, we are more apt to see failure of the lung to reexpand after refills have been discontinued. With expansion prevented either by a thickened parietal pleura, or adhesions, or failure of the mediastinum to shift, a pleural space remains. This space, if it remains a space, must fill with fluid, which if under pressure, or even if not under pressure, may result in what is probably the most dreaded complication, a broncho-pleural fistula, followed by a mixed infection tuberculous empyema. Thoracoplasty then becomes imperative with the same urgency that is present in an acute appendix—and even with a thoracoplasty, the mortality runs over 50 per cent. So you see from even this brief outline of the complications of pneumothorax, its initiations should be undertaken at all times only on those cases which after a period of bed rest fail to improve.

During the past five years, fifteen thousand cases have been admitted to the Tuberculosis Wards of Bellevue Hospital and during this period artificial pneumothorax was initiated on approximately 1750. In addition to this Ward Service, some 500 patients each year receive refills in the Out Patient Department. A recent review of these initiat-

ed pneumothoracies, namely the 1750, showed that tuberculous empyema occurred in 137, or approximately 8 per cent. Bronchopleural fistula occurred, however, in 36 of these cases. The result of surgical treatment showed in this group a mortality of about 50 per cent.

While we must recognize that bed rest is the backbone in the treatment of pulmonary tuberculosis, we must also realize that there are many cases not responding to bed rest, who never would be returned to productive life were it not for the institution of collapse therapy.

Pleurisy with effusion as the mode of onset of tuberculosis deserves more consideration than is often given. I believe that too little attention is given to the local condition and, as often happens with the absorption of fluid and the return of the patient's temperature to normal, he is allowed to again take up active life. This is wrong. Pleurisy with effusion is not only a disease of the pleura, but more often secondary to disease of the lung, and in all instances should be treated in just the same way that you would treat an active pulmonary tuberculosis, by bed rest, and for a long time after all signs and symptoms have disappeared, at least six months. It may be necessary to remove the fluid from the pleural cavity, certainly so if respiration is embarrassed. Upon removal, x-ray examination can best determine the presence or absence of a parenchymal lesion.

If a parenchymal lesion is present, and more so if a cavity is visualized, fluid withdrawn should be replaced by air, and conversion made into a hydro-pneumothorax in order to better control the pulmonary lesion. As often happens, this is not done, with the result that a pleural symphysis occurs obliterating any free pleural space, and future attempts at artificial pneumothorax become impossible. If after removal of fluid, no parenchymal lesion is seen, it is perhaps best not to instil air, to allow the fluid to absorb, not tapping unless for relief of mechanical embarrassment. With the return of the patient to normal status, there should be undertaken a prolonged period of bed rest, for only in this way may any active pulmonary process become arrested or any subsequent manifestation of pulmonary disease be prevented.

Another form requiring our especial attention is endobronchial tuberculosis. This may be responsible for a positive sputum in the absence of any cavity or the evidence of any parenchymal disease, yet its potential danger may be very great. The presence of a wheeze in any tuberculous patient should be considered an indication for bronchoscopy. After many failures at local treatment with silver nitrate and direct application of quartz light, we have about reached the decision that bed rest is perhaps the most effective.

So much for the medical aspects of treatment, all of which if taken in time will remove the necessity for surgical intervention in the larger proportion of cases.

For those not so fortunate as to have had an early diagnosis made, and also for those who have been unable to have successful artificial pneumothorax performed, surgery, by way of aiding such collapse, has been the means of saving lives and restoring the less fortunate to normal activity.

Various surgical procedures have been advanced primarily as an aid to the unsuccessful pneumothorax, and as has just been mentioned, the unsuccessful case is that one wherein the sputum has failed to become converted. Continuation of an artificial pneumothorax which fails to convert sputum should not be carried on over a long period of time, certainly not over a few months, without resort to other methods of collapse therapy.

The presence of adhesions which serve to hold open cavities, is one of the very common complications and usually is very readily dealt with. Internal pneumolysis consists in the cutting of these adhesions under direct thoracoscopic guidance, by means of high frequency current. It is usually necessary to determine the character of these adhesions by means of the thoracoscope, as the x-ray tells little as to their character and location. With prolongation of lung tissue into the adhesion, it becomes unwise to attempt operation. The operation calls for exacting surgical skill, but as far as the patient is concerned, there is little or no reaction. Complications such as hemorrhage are not common with the use of high frequency. They are more common if galvanocautery is used.

In the event of failure to perform intra-

pleural pneumonolysis, consideration must be given to the less radical procedures before consideration of the more radical. Temporary phrenicotomy, or crushing of the phrenic nerve, is now used much less than formerly and a phrenic neurectomy should never be used. Given a cavity without a thick wall surrounded by good lung, and in the absence of exudation, phrenic nerve crushing might be considered. Its good results, however, scarcely outweigh the bad. Often the contemplated temporary paralysis becomes permanent and if done on the left side, symptoms from gastric dilatation result. If upper stage thoracoplasty is later decided upon, phrenic paralysis interferes with functional capacity. Rather than perform phrenic crush, the next step might better be extra-pleural thoracoplasty. Done in any number of stages, it serves to transform the unsuccessful pneumothorax, or the unattainable pneumothorax, into a permanent collapse.

This procedure is considered only after artificial pneumothorax has failed to control the disease, or to close cavities. With present technic, operative mortality is low, and if consideration is given to contraindications, results are generally good. Operation should not be undertaken in the presence of extensive bilateral disease. The type of disease, the indications of activity of disease, the presence of emphysema and fibrosis, the age of the patient, are all important factors. More study of the patient is needed here than for those given artificial pneumothorax. Those selected for thoracoplasty preferably have the fibroid or productive type of disease, unilateral in extent, free from symptoms of activity, usually under fifty years of age. If emphysema and fibrosis are present, functional studies to determine the breathing capacity should not be neglected. The operation should always be done in stages, the number depending upon the amount of lung it becomes necessary to collapse. The first stage should involve not more than the removal of the upper two to four ribs, the second stage being done ten days to two weeks afterwards, a third stage following after a similar interval. If basal cavities are present, it is perhaps better to reverse the stages and remove the lower ribs first. If bilateral apical lesions are present, it is quite feasible to perform a bilateral partial thoracoplasty.

Recently, consideration has been given to the idea of performing surgical collapse primarily, and in place of any attempt at artificial pneumothorax, the idea being to avoid the possible complications of pneumothorax, and in addition, if the lesion is limited to the apex, to avoid the sacrifice of such a large portion of normal lung. Were our foresight as good as our hindsight, I have no doubt but that this procedure would be more readily employed.

Extrapleural pneumothorax consists in the separation of the parietal pleura from the endothoracic fascia, and the establishment of an extrapleural space. This space serves as the pneumothorax space. The operation is carried out in those selected cases on whom artificial pneumothorax has been tried and failed, and in those cases considered poor surgical risks and unable to undergo the operation of extrapleural thoracoplasty. There is less shock to this procedure and it may be done under local anaesthesia. Its use is restricted to upper lobe lesions especially upper lobe cavities, provided the cavities are not located immediately beneath the parietal pleura. The contraindication of cavities so located is the probability of direct extension of infection into the extrapleural space. The fact that refills are constantly necessary and at fairly frequent intervals, together with the possibility for infection of the space, constitute serious objection to this type of procedure.

A more recent surgical method is that of direct cavity aspiration (Monaldi). This is not a substitute for other procedures, but is to be used where pneumothorax is impossible or when the patient's general condition contraindicates thoracoplasty. It is essential that pleural symphysis exists. Localization of the cavity by stereoscopic, as well as lateral, films is necessary, and then with proper technic, the cavity is entered by trocar cannula, a radiopaque catheter is introduced and fastened in place. Suction is applied gently but not continuously and usually not for more than 6 to 8 hours out of 24. Reduction in cough and sputum occurs almost at once and conversion of the sputum in successfully drained cavities occurs within 2 to 3 months. It is too soon to definitely evaluate this procedure and more study is necessary, especially as to indica-



tions and contraindications.

With all these types of surgical treatment let me emphasize the importance of having the medical man and the surgeon work together.

Surgical management is relatively a new subject. It was only a few years ago that any kind of surgery for the treatment of tuberculosis was considered ill advised. The continuous study of the problems, the indications and contraindications for operation, have increased its usefulness and more patients will be referred for surgery in whom the disease is less advanced. A far better way, however, of meeting this problem is by restricting the number of cases in which surgery becomes necessary by a more dili-

gent use of the x-ray. Find the cases early, don't be afraid to put the asymptomatic as well as the symptomatic case on prolonged bed rest, and the need for surgery of any sort will diminish.

Having passed in review the devious ways human ingenuity has found to catch up with progressive tuberculosis in the lungs with only a little better than a 50 per cent chance of arresting it, let me now leave you with this message which remains the crux of the problem in the treatment of this disease. Pulmonary tuberculosis is easier to control just at the time when the potential danger is also greatest, namely at its onset.

105 East 53rd Street

## Organization News

### DR. LOUIS MARK HEADS HOSPITAL STAFF

Dr. Louis Mark, Columbus, Ohio, Governor of the College for Ohio and President of the Ohio Chapter of the College, has been appointed Chairman of the Medical Staff of the White Cross Hospital, Columbus, Ohio. Announcement of the appointment was made by Dr. Frank Fowler, Superintendent of the White Cross Hospital. Dr. Mark is also Medical Director of Rocky Glen Sanatorium, McConnelsville, Ohio; and of the J. N. Case Tuberculosis Sanatorium, Delaware, Ohio.

### CUBAN CHAPTER MEETS

A meeting of the Cuban Chapter of the College was held at the "Instituto de Vias Respiratorias," Havana, Cuba, on February 3rd. A Symposium on Primary Carcinoma of the Lungs was presented by the following speakers:

- |                    |                   |
|--------------------|-------------------|
| 1) Pathology       | Dr. Juan Llambes  |
| 2) Clinical Aspect | Dr. Rogelio Lavin |
| 3) Radiology       | Dr. Luis Farinas  |
| 4) Bronchoscopy    | Dr. Jose Gros     |

Dr. F. J. Menendez, Secretary  
Cuban Chapter, American College  
of Chest Physicians

### NEW JERSEY CHAPTER MEETS

A meeting of the New Jersey Chapter of the College was held at the Robert Treat Hotel, Newark, New Jersey, on January 7th, with Dr. Stephen A. Douglass, Paterson, New Jersey, presiding.

The minutes of the previous meeting held October 30, 1941, were read and approved. An invitation to attend the Scientific Session sponsored by the New York State Chapter of the College was read and accepted. All members of the New Jersey Chapter were urged to attend the meeting to be held at the Biltmore Hotel, New York City, on January 23rd.

A letter from Dr. Joseph R. Morrow, President of the Chapter, indicated that due to illness, Dr. Samuel B. English could not serve on the Program Committee and Dr. Douglass was named in his place. The Program Committee is comprised of: Dr. M. James Fine, Newark, Chairman; Dr. Stephen A. Douglass, Paterson; Dr. Harold S. Hatch, Morristown; and Dr. Charles I. Silk, Perth Amboy.

The next meeting of the Chapter will be held April 1, 1942.

Charles I. Silk, Secretary  
New Jersey Chapter, American  
College of Chest Physicians

## NEW YORK STATE CHAPTER MEETING

The annual meeting of the New York State Chapter of the American College of Chest Physicians was held at the Hotel Biltmore, New York City, on January 23, 1942. Over one hundred members and guests registered for the scientific session.

Papers were read by Dr. Henry K. Taylor, Director Department of Roentgenology, Welfare Hospital, New York City; Dr. Bart Young, Associate Professor of Roentgenology, Temple University Medical School, Philadelphia, Pa.; Dr. Julian Johnson, Director Department of Thoracic Surgery, University of Pennsylvania Hospital, Philadelphia, Pa.; Dr. Louis Clerf, Director Department of Broncho-Esophagology, Jefferson Medical College, Philadelphia, Pa.; Dr. John Kernan, Director Department of Broncho-Esophagology, Columbia University Medical School, New York City; and Dr. Samuel Thompson, Director Department of Thoracic Surgery, Metropolitan Hospital, New York City.

The luncheon guest speaker was Dr. Samuel J. Kopetzky of New York City, whose subject was "Medical Preparedness."

During the Chest X-ray conference, which was an added feature of this year's meeting, Dr. Israel Steinberg, of New York City, gave a most instructive presentation on the value of intravenous diodrast study as an aid in the x-ray differential diagnosis between Aneurysms and Neoplasms involving the mediastinal region.

The morning session, owing to the absence of Dr. Nelson Strohm of Buffalo, New York, on account of illness, was conducted by Dr. James S. Edlin, of New York City. The afternoon session was conducted by Dr. Arthur Q. Penta, of Schenectady, New York.

During the past year, the officers of the New York State Chapter have succeeded in interesting the New York State Medical Society to hold a symposium on diseases of the chest, as a part of the regular State Medical Meeting, which will be held this year at the Waldorf-Astoria Hotel, New York City, April 30, 1942. The program which has been arranged and sponsored by the New York State Chapter, includes the following speakers:

Dr. Edgar Mayer, New York City, who has been chosen as the recipient of the A. Walter Suiter Lectureship of the Medical Society of

New York. This Lectureship is awarded to the outstanding speaker of the General Sessions. The New York State Chapter is justly proud to have one of its members and former President be selected as the outstanding speaker of the meeting. Dr. Mayer's presentation will be, "New Aspects of Pulmonary Tuberculosis and Their Significance in Medical Practice."

Dr. Eugene P. Pendergrass, Professor of Roentgenology, University of Pennsylvania Medical School and Director Department of Radiology, University of Pennsylvania Hospital, Philadelphia, Pa., will present a paper on "The Role of the Radiologist in the Diagnosis of Lesions Involving the Respiratory Tract."

Dr. Richard Overholt, Boston, Mass., formerly Director Department on Thoracic Surgery, Lahey Clinic, will present a paper on, "Cancer of the Lung."

Dr. Arthur Q. Penta, Visiting Lecturer in the Department of Medicine, Temple University Medical School, Philadelphia, Pa., and Director of the Bronchoscopic Clinic of the Schenectady City Hospital, will present a paper on, "The Role of the Bronchoscopist in the Diagnosis and Treatment of Diseases Involving the Bronchial Pulmonary Tract."

The above mentioned papers will be given before the General Assembly on the afternoon of Thursday, April 30, 1942, Waldorf-Astoria Hotel, New York City. The officers of the New York State Chapter sincerely hope that every member of the State Chapter will be in attendance.

Arthur Q. Penta, Secretary  
New York State Chapter of the  
American College of Chest Physicians

## MICHIGAN CHAPTER ORGANIZED

The Michigan Chapter of the College was organized at Detroit on January 20th. The Constitution and By-Laws for the Michigan Chapter, as presented by the Board of Regents of the American College of Chest Physicians, were read and adopted.

The following officers were elected: Dr. Willard B. Howes, Detroit, President; Dr. S. M. Gelenger, Flint, Vice-President; and Dr. Donald MacInnis, Pontiac, Secretary-Treasurer.

(Continued to page 94)

# Next Month We Present

## ALLERGIC COUGH

Samuel J. Prigal, M.D., New York, New York

## EXTRAPULMONARY NON-TUBERCULOUS DISEASE COMPLICATING PULMONARY TUBERCULOSIS

E. Rosenman, M.D., F.A.C.C.P., Duarte, California

## AMBULATORY BILATERAL PNEUMOTHORAX

Oren A. Beatty, M.D., Glasgow, Kentucky

## THE ROAD TO EARLY DIAGNOSIS

J. R. Patton, M.D., Ogdensburg, New York

## PULMONARY ACTINOMYCOSIS

Charles J. Koerth, M.D., J. M. Donaldson, Jr., M.D.,  
and C. C. Pinson, M.D., San Antonio, Texas

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Dr. William A. Hudson, Governor of the College for Michigan, outlined the following program for the Chapter. He suggested that the Chapter hold meetings in the spring and fall of the year, and that the meetings be planned so that they do not interfere with existing organizations—the fall meeting, to be held in conjunction with or just preceding the annual meetings of the Michigan State Medical Society. These recommendations were approved and a program committee was appointed by the president to arrange for the program for both meetings.

Dr. Hudson further recommended that Associate Members be considered as students preparing for a final examination, which is to come at the end of their period of associate membership, and that during that period of associate membership, they be given certain assignments. Their early assignments should be basic, dealing primarily with anatomy and physiology; and as they near the completion of their associate membership, their assignments should deal more specifically with clinical problems, surgical and medical. All Associate Members would be required to report at the spring and fall meetings of the Chapter on their accomplishments as regards the assignments given them. These reports would preferably be presented in the form of theses, which could be studied and discussed at round table conferences held during the meetings. All of the above recommendations were accepted by the State Chapter.

Members appointed to the Program Committee are: Dr. Wm. P. Chester, Detroit; Dr. Ferdinand Chenik, Detroit; and Dr. A. R. Young, Pontiac.

## OBITUARY

DR. LeROY S. PETERS

*Albuquerque, New Mexico*

1882-1941

The medical profession and New Mexico have lost one of their best friends in the death of Dr. LeRoy S. Peters. Dr. Peters graduated from the College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois in 1906. In 1907, he developed tuberculosis and went to Silver City, New Mexico, where he became the Medical Director of the Cottage Sanatorium. In 1914, he moved to Albuquerque, where he remained and practiced until his death.

At the time of his death, he was the Governor of the American College of Chest Physicians for the State of New Mexico. He was a Charter Member of the Society and he had served as an Associate Editor of "Diseases of the Chest" for a number of years. Dr. Peters was a Fellow of the American College of Physicians and a member of the American Association for Thoracic Surgery. He was a past president of the American Sanatorium Association and he had served for many years as a director of the National Tuberculosis Association. He was active in local and district medical societies and he served as president of the Southwestern Medical and Surgical Association.

Dr. Peters was a familiar figure at medical meetings and he leaves behind him a host of friends who mourn his death.

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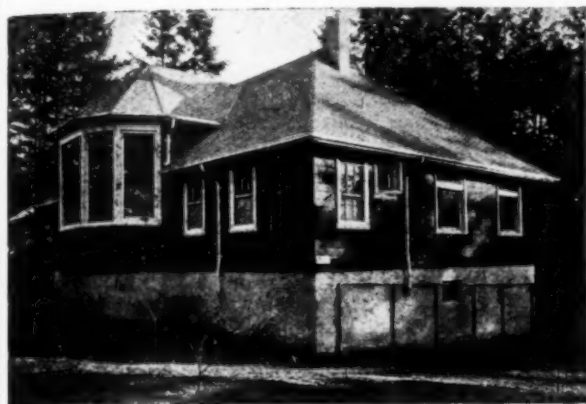
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 Beringer, Lester E., Lieut. Col., Camp Claiborne, La.  
 Crawford, Paul M., Lieut. Col., West Point, N. Y.  
 Franklin, Daniel, Lieut. Col., Fort Knox, Kentucky  
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 Roberts, Edwin H., Lieut. Col., Camp Forrest, Tenn.  
 Thompson, William L., Lieut. Col., Washington, D. C.

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 Cooney, James P., Major, Ancon, Canal Zone  
 de Lorimer, Alfred A., Major, Washington, D. C.  
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Hughes, S. Erwin Jr., Lieut. Comdr., San Diego, California

Mayne, Roy M., Lieut. Comdr., Duluth, Minnesota

Volk, Ralph, Lieut. Comdr., Boston, Massachusetts  
 Wheeler, Daniel W., Lieut. Comdr., Bremerton, Washington

Whitehead, Hugh G., Lieut. Comdr., Denver, Colo.

## NEW BOOKS RECEIVED

THE BLOOD BANK AND THE TECHNIQUE AND THERAPEUTICS OF TRANSFUSIONS, By Robert A. Kilduffe, A.B., A.M., M.D., F.A.S.C.P., Director, Laboratories, Atlantic City Hospital; and Michael DeBailey, B.S., M.D., M.S., F.A.C.S., Assistant Professor of Surgery, School of Medicine, Tulane University of Louisiana. 558 pp., 214 illustrations, 1 color plate. Price \$7.50. The C. V. Mosby Company, St. Louis, Missouri.